# PHYTOCHEMISTRY

*THE INTERNATIONAL JOURNAL*
*OF PLANT BIOCHEMISTRY*

*Editor-in-Chief*

**J. B. HARBORNE F.R.S.**

*Associate Editor (North America)*

**N. G. LEWIS**

*Executive Editor*

**T. A. SMITH**

Volume 41 Contents, Author Index and
Subject Index 1996

**PERGAMON**

# PHYTOCHEMISTRY

## The International Journal of Plant Biochemistry



*Editor-in-Chief*

J. B. HARBORNE F.R.S.: Plant Science Laboratories, The University, Whiteknights, Reading RG6 2AS, Berks., U.K.

*Associate Editor (North America)*

N. G. LEWIS: Institute of Biological Chemistry, Washington State University, Pullman, WA 99164-6340, U.S.A.

*Executive Editor*

T. A. SMITH: Long Ashton Research Station, Bristol BS18 9AF, U.K.

*Associate Editors*

L. J. GOAD: Dept of Biochemistry, Liverpool University, Liverpool L69 3BX, U.K.

P. J. HOLLOWAY: Long Ashton Research Station, Bristol BS18 9AF, U.K.

P. J. LEA (Review Editor): Division of Biological Science, University of Lancaster, Lancaster LA1 4YQ, U.K.

D. R. THRELFALL: Dept of Applied Biology, School of Life Sciences, University of Hull, Hull HU6 7RX, U.K.

C. A. WILLIAMS: Plant Science Laboratories, The University, Whiteknights, Reading RG6 2AS, Berks., U.K.

*Production Editor*

R. J. COLLINS: Journals Production Dept, Research Journals, Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. Tel: +44(0) 1865 843519. Fax: +44(0) 1865 843969. E-mail: chemistry.production@elsevier.co.uk

EDITORIAL BOARD—1996

| | |
|---|---|
| Y. Asakawa: | Faculty of Pharmaceutical Sciences, Tokushima Bunri University, Yameshiro-cho, 770 Tokushima, Japan. |
| E. A. Bell: | Pharmacology Group, King's College, Manresa Road, London SW3 6LX, U.K. |
| E. G. Brown: | Dept of Biochemistry, University College of Swansea, Singleton Park, Swansea, SA2 8PP, U.K. |
| E. E. Conn: | Dept of Biochemistry and Biophysics, University of California, Davis, CA 95616, U.S.A. |
| G. Cordell: | Program for Collaborative Research in the Pharmaceutical Sciences, College of Pharmacy, University of Illinois at Chicago, IL 60612, U.S.A. |
| R. Croteau: | Institute of Biological Chemistry, Washington State University, Pullman, WA 99164-6340, U.S.A. |
| V. De Luca: | Dept de sciences biologiques, Institut de recherche en biologie vegetale, Universite de Montreal, 4101 est rue Sherbrooke, Montreal, Quebec, Canada H1X 2B2. |
| B. Ellis: | Dept of Plant Science, University of British Columbia, 2357 Main Hall, Vancouver, B.C., Canada V6T 1Z4. |
| N. H. Fischer: | Dept of Chemistry, Louisiana State University, Baton Rouge, LA 70803, U.S.A. |
| L. Fowden: | Rothamsted Experimental Station, Harpenden, Herts., U.K. |
| T. W. Goodwin: | 9 Woodlands Close, Parkgate, S. Wirral, Cheshire L64 6RU, U.K. |
| O. R. Gottlieb: | Instituto de Quimica, Universidade de São Paulo, C.P. 20780, São Paulo 01498, Brazil. |
| J. L. Harwood: | Dept of Biochemistry, University of Wales, P.O. Box 903, Cardiff CF1 1ST, U.K. |
| V. Herout: | Dept of Natural Products, Inst. Organic Chemistry, Flemingovo N2, Praha 6, Czech Republic. |
| W. Herz: | Dept of Chemistry, The Florida State University, Tallahassee, FL 32306, U.S.A. |
| K. Hostettmann: | Institut de Pharmacognosie et Phytochemie, B.E.P., 1015 Dorigny-Lausanne, Switzerland. |
| M. Luckner: | Sektion Pharmazie, Universität Halle (Saale), Germany. |
| T. J. Mabry: | Dept of Botany, University of Texas at Austin, TX 78713, U.S.A. |
| P. Mazliak: | Lab. de Physiologie Cellulaire, Université Pierre et Marie Curie, 75005 Paris, France. |
| B. V. Milborrow: | School of Biochemistry, University of NSW, P.O. Box 1, Kensington, NSW 2033, Australia. |
| T. Okuda: | Kitakata 3-4-25, Okayama City 700, Japan. |
| J. D. Phillipson: | School of Pharmacy, University of London, 29/39 Brunswick Square, London WC1N 1AX, U.K. |
| J. E. Poulton: | Dept of Botany, University of Iowa, Iowa City, IA 52242, U.S.A. |
| T. ap Rees: | Botany School, University of Cambridge, Downing Street, Cambridge CB2 3EA, U.K. |
| U. Sankawa: | Faculty of Pharmaceutical Sciences, Dept of Pharmacognosy, Toyama Medical and Pharmaceutical University, 2635 Sugitani, Toyama 930-10, Japan. |
| J. Tempe: | Institut des Sciences Végétales, CNRS, 91198-Gif sur Yvette and Institut National Agronomique Paris-Grignon, 75231-Paris, France. |
| G. H. N. Towers: | Dept of Botany, University of British Columbia, 2357 Main Hall, Vancouver, B.C., Canada V6T 1Z4. |
| H. Wagner: | Inst. für Pharmazeutische Biologie, Karlstrasse 29, 8 München 2, Germany. |
| P. G. Waterman: | Phytochemistry Research Laboratories, Dept of Pharmacy, University of Strathclyde, 204 George Street, Glasgow G1 1XW, U.K. |
| M. H. Zenk: | Inst. für Pharmazeutische Biologie, Karlstrasse 29, 8 München 2, Germany. |


All manuscripts and contributions should be submitted to either J. B. HARBORNE at Reading or N. G. LEWIS at Pullman. Authors are earnestly requested to consult the latest 'Instructions to Authors', which are published in Vol. 41, No. 1 (copies of these instructions are available from the Reading office) and the 'Aims and Scope' of the journal (see inside back cover). Review articles are welcomed, but intending Authors should send an outline to P. J. LEA before preparing their manuscripts. Books for review should be sent to J. B. HARBORNE.

This journal has been designated an official organ of the 'The Phytochemical Society of Europe' and 'The Phytochemical Society of North America' and Society announcements will appear at regular intervals. Reduced subscription rates are available to members of both Societies (details available from Society offices).


**Publishing and Advertising Offices**: Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K.
**Annual Subscription Information**: Published monthly plus additional issues in January, March, May, July, September and November (three volumes 1996).

**Institutional Subscription Rates** (1996): North, Central and South America, U.S.$2110.00, Rest of World, £1327.00. Associated Personal Subscription Rates are available on request for those whose institutions are library subscribers. Sterling prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices include postage and insurance and are subject to change without notice. Subscription enquiries from customers in North America should be sent to: Elsevier Science Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A., and from the rest of the world to: Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. *Microform Back Issues:* Back issues of all previously published volumes, in both hard copy and on microform, are available direct from Elsevier Science Offices (Oxford, New York).



Copyright © 1996 Elsevier Science Ltd



SECOND CLASS POSTAGE PAID AT NEWARK, NEW JERSEY AND ADDITIONAL ENTRY POINTS. *Phytochemistry* (**ISSN 0031–9422**) is published **monthly, January to December plus additional issues in January, March, May, July, September and November in three volumes**, by Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. The annual subscription in the U.S.A. is **$2110**. *Phytochemistry* is distributed by Mercury Freight International Ltd, 10 Camptown Road, Irvington, New Jersey 07111-1105. POSTMASTER: Please send address corrections to *Phytochemistry*, c/o Elsevier Science Inc., 660 White Plains Road, Tarrytown, NY 10591-5153.


**Front cover illustration**: Leaves and fruit of *Juglans nigra*.

# CONTENTS OF VOLUME 41

## Number 1


**Review Article Number 110**

Bioactive Acylphloroglucinol derivatives from *Eucalyptus* species — 7 E. L. Ghisalberti

**Growth and Metabolism**

Synthesis, metabolism and biological activity of a deuterated analogue of the plant hormone *S*-( + )-abscisic acid — 23 N. Lamb, N. Wahab, P. A. Rose, A. C. Shaw, S. R. Abrams, A. J. Cutler, P. J. Smith, L. V. Gusta and B. Ewan

δ-Acetylornithine as a major nitrogen storage compound in *Bistorta bistortoides* — 29 D. A. Lipson, T. K. Raab and R. K. Monson

Nitrogen recycling in phenylpropanoid metabolism — 31 R. Razal, S. Ellis, S. Singh, N. G. Lewis and G. H. N. Towers

Evidence for intramineral macromolecules containing protein from plant silicas — 37 C. C. Harrison

Tyrosine residues enhance cross-linking of synthetic proteins into lignin-like dehydrogenation products — 43 G. J. McDougall, D. Stewart and I. M. Morrison

Inhibition of chloroplast protein phosphorylation by cAMP in *Lemna paucicostata* 6746 — 49 L. Gangwani, J. P. Khurana and S. C. Maheshwari

Selective inhibition of cyclic AMP-dependent protein kinase by amphiphilic triterpenoids and related compounds — 55 Bing Hui Wang and G. M. Polya

Spinach chloroplast ATP-dependent endopeptidase: Ti-like protease — 65 M. Benešová, G. Ďurčová, S. Kužela, E. Kutejová and M. Pšenák

Conidial alkaline phosphatase from *Neurospora crassa* — 71 J. C. Say, R. P. M. Furriel, P. Ciancaglini, J. A. Jorge, M. Lourdes, T. M. Polizeli, J. M. Pizauro, H. F. Terenzi and F. A. Leone

Inhibition of chitinolytic activities from tree species and associated fungi — 77 A. Hodge, G. W. Gooday and I. J. Alexander

Cell cycle inhibition by sodium butyrate in legume root meristems — 85 W. A. Tramontano and C. Scanlon

Platelet activating factor and lyso-phosphatidyl cholines from strawberry — 89 M. Calligerou, A. Siafaka-Kapadai, D. Galanopoulou, S. T. Weintraub and M. Mavri-Vavayanni

Similarities of the biological activities of coronatine and coronaf acic acid to those of jasmonic acid — 93 Y. Koda, K. Takahashi, Y. Kikuta, F. Greulich, H. Toshima and A. Ichihara

Immunoquantitative analysis of artemisinin from *Artemisia annua* using polyclonal antibodies — 97 J. F. S. Ferreira and J. Janick

Effect of calcium chloride on heavy metal induced alteration in growth and nitrate assimilation of *Sesamum indicum* seedlings — 105 N. Bharti, R. P. Singh and S. K. Sinha

**Ecological Biochemistry**

Secoiridoids and antifungal aromatic acids from *Gentiana algida* — 111 R. X. Tan, J.-L. Wolfender, W. G. Ma, L. X. Zhang and K. Hostettmann

Limonoid antifeedants from *Melia toosendan* — 117 Jian-Bo Zhou, H. Okamura, T. Iwagawa and M. Nakatani

Structure–activity relationships of synthetic saponins 121 M. Takechi, C. Uno and Y. Tanaka

Structure–activity relationships of synthetic cardiac glycosides 125 M. Takechi, C. Uno and Y. Tanaka

Insecticidal constituents from rhizomes of *Zingiber cassumunar* and *Kaempferia rotunda* 129 B. W. Nugroho, B. Schwarz, V. Wray and P. Proksch

Release and ecological impact of algicidal hydrolysable polyphenols in *Myriophyllum spicatum* 133 E. M. Gross, H. Meyer and G. Schilling

Oviposition stimulants for the monarch butterfly: Flavonol glycosides from *Asclepias curassavica* 139 M. Haribal and J. A. A. Renwick

**Biosynthesis**

Formation of L-ascorbic acid and oxalic acid from D-glucosone in *Lemna minor* 145 K. Saito

Presence of microthecin in the red alga *Gracilariopsis lemaneiformis* and its formation from 1,5-anhydro-D-fructose 151 A. Broberg, L. Kenne and M. Pedersén

Sterol composition and synthesis in potato tuber discs in relation to glycoalkaloid synthesis 155 A. Bergenstråhle, P. Borgå and L. M. V. Jonsson

Metabolism of 24-*epi*-castasterone and 24-*epi*-brassinolide in cell suspension cultures of *Ornithopus sativus* 163 A. Kolbe, B. Schneider, A. Porzel and G. Adam

Caffeine biosynthesis starts with the metabolically channelled formation of 7-methyl-XMP—A new hypothesis 169 B. H. Schulthess, P. Morath and T. W. Baumann

**Cell Culture and Biotechnology**

Developmental changes of lipoxygenase and fatty acid hydro-peroxide lyase activities in cultured cells of *Marchantia polymorpha* 177 K. Matsui, Y. Kaji, T. Kajiwara and A. Hatanaka

Polyacetylene glucosides in hairy root cultures of *Lobelia cardinalis* 183 M. Yamanaka, K. Ishibashi, K. Shimomura and K. Ishimaru

Lipid composition of microsomes from heat-stressed cell suspension cultures 187 E. H. Styer, B. D. Whitaker, S. L. Kitto and D. G. Hoover

Production of scopadulciol by cultured tissues of *Scoparia dulcis* 193 T. Hayashi, K. Gotoh and K. Kasahara

Metabolism of 24-*epi*-castasterone in cell suspension cultures of *Lycopersicon esculentum* 197 T. Hai, B. Schneider, A. Porzel and G. Adam

**Chemotaxonomy**

Essential oil composition of four Turkish species of *Sideritis* 203 N. Ezer, R. Vila, S. Cañigueral and T. Adzet

Terpenoids and aromatic compounds from six liverworts 207 F. Nagashima, S. Momosaki, Y. Watanabe, M. Toyota, S. Huneck and Y. Asakawa

**Bioactive Plant Products**

Cytotoxic benzyl dihydroflavonols from *Cudrania tricuspidata* 213 In-Kyoung Lee, Chang-Jin Kim, Kyung-Sik Song, Hwan-Mook Kim, H. Koshino, M. Uramoto and Ick-Dong Yoo

Biologically active flavonoids and terpenoids from *Egletes viscosa* 217 M. A. S. Lima, E. R. Silveira, M. S. L. Marques, R. H. A. Santos and M. T. P. Gambardela

**Plant Chemistry**

New pentapeptides from *Aster tataricus* 225 Dong-Liang Cheng, Yu Shao, R. Hartmann, E. Roeder and K. Zhao

| | | |
|---|---|---|
| Alkene-γ-lactones and avocadofurans from *Persea indica*: a revision of the structure of majorenolide and related lactones | 229 | B. M. Fraga and D. Turrero |
| Two phthalides from *Ligusticum chuanxiong* | 233 | T. Naito, Y. Ikeya, M. Okada, H. Mistuhashi and M. Maruno |
| Monoterpene glycosides from *Paeonia suffruticosa* | 237 | Hang-Ching Lin, Hsiou-Yu Ding, Tian-Shung Wu and Pei-Lin Wu |
| Two guaiane and eudesmane-type sesquiterpenoids from *Neocallitropsis pancheri* | 243 | P. Rakotondramanana, J.-P. Bianchini, R. Faure, A. Cambon and M. Azzaro |
| *Neo*-clerodane diterpenoids from *Scutellaria galericulata* | 247 | B. Rodríguez, M. C. de la Torre, B. Rodríguez and P. Gómez-Serranillos |
| Diterpenoids from leaves of *Cryptomeria japonica* | 255 | Wen-Chiung Su, Jim-Min Fang and Yu-Shia Cheng |
| Triterpenoids from *Antrodia cinnamomea* | 263 | I-Hwa Cherng, De-Peng Wu and Hung-Cheh Chiang |
| Triterpenoid saponins from *Maesa lanceolata* | 269 | J. B. Sindambiwe, A. M. Baldé, T. De Bruyne, L. Pieters, H. Van den Heuvel, M. Claeys, D. A. Van den Berghe and A. J. Vlietinck |
| A sterol glycoside from leaves of *Clerodendron colebrookianum* | 279 | P. Goswami, J. Kotoky, Ze-Nai Chen and Yang Lu |
| Furostanol glycosides from bulbs of *Allium chinense* | 283 | Jun-Peng Peng, Xin-Sheng Yao, Y. Tezuka and T. Kikuchi |
| A neolignan and lignans from *Magnolia biondii* | 287 | Yu-Liang Ma, Qiuli Huang and Gui-Qiu Han |
| An acetophenone glycoside from *Exacum* affine | 289 | H. Kuwajima, N. Shibano, T. Baba, K. Takaishi, K. Inoue and T. Shingu |
| Acetophenones from *Cyanchum taiwanianum* | 293 | Pao-Lin Huang, Chai-Ming Lu, Ming-Hong Yen, Ru-Rong Wu and Chun-Nan Lin |
| Peroxides and other constituents from *Heterothalamus alienus* | 297 | G. Rücker, E. Schenkel, D. Manns, M. Falkenberg and A. Marek |
| New aspects of anthocyanin complexation. Intramolecular copigmentation as a means for colour loss? | 301 | P. Figueiredo, M. Elhabiri, K. Toki, N. Saito, O. Dangles and R. Brouillard |
| A flavone *C*-glycoside and an aromatic glucoside from *Gentiana* species | 309 | Shih-Hsien Kuo, Ming-Hong Yen, Mei-Ing Chung and Chun-Nan Lin |
| Oxindole alkaloids from *Alstonia macrophylla* | 313 | Wah-Hun Wong, Pek-Boon Lim and Cheng-Hock Chuah |
| Millingtonine, an unusual glucosidal alkaloid from *Millingtonia hortensis* | 317 | T. Hase, K. Ohtani, R. Kasai, K. Yamasaki and C. Picheansoonthon |
| Alkaloids from *Crinum firmifolium* var. *hygrophilum* | 323 | J. Razafimbelo, M. Andriantsiferana, G. Baudouin and F. Tillequin |
| Isolation of paspaline B, an indole-diterpenoid from *Penicillium paxilli* | 327 | S. C. Munday-Finch, A. L. Wilkins and C. O. Miles |

| | | |
|---|---|---|
| $\alpha$-Pyrone from *Cryptocarya latifolia*—a structural isomer of umuravumbolide | 333 | S. E. Drewes, M. H. Horn and C. S. Wijewardene |
| Sesquiterpene lactones and other constituents of *Centaurea nicaensis* | 335 | M. Bruno, M. P. Paternostro, T. E. Gedris and W. Herz |
| Luteolin 7-*O*-sophoroside from *Pteris cretica* | 337 | F. Imperato and R. Nazzaro |
| *Seco*-isotetrandrine from *Laurelia sempervirens* | 339 | G. Schmeda-Hirschmann, M. Dutra-Behrens, G. Habermehl and J. Jakupovic |
| **Book Review** | 343 | |


## Number 2


| | | |
|---|---|---|
| **Growth and Metabolism** | | |
| Properties of a polynucleotide synthesized by strain 74A of *Neurospora crassa* | 345 | E. C. Carmona, S. W. Han, M. S. Palma and A. Rossi |
| Stability of ascorbate oxidase extracted from *Cucurbita pepo* | 349 | S. Maritano, T. Kohzuma, S. Suzuki and A. Marchesini |
| Phosphatidate phosphatase from developing seeds and microspore-derived cultures of *Brassica napus* | 353 | M. G. Kocsis, R. I. Weselake, J. A. Eng, T. L. Furukawa-Stoffer and M. K. Pomeroy |
| Purification and characterization of $\alpha$-amylase from poplar leaves | 365 | W. Witt and J. J. Sauter |
| Properties of an arginase from the cotyledons of *Phaseolus vulgaris* | 373 | N. Carvajal, N. Olave, M. Salas, E. Uribe and S. Enríquez |
| Endopeptidases during the development and senescence of *Lolium temulentum* leaves | 377 | K. Morris, H. Thomas and L. J. Rogers |
| Characterization of extracellular proteases from *Trametes trogii* | 385 | C. Caporale, A. M. V. Garzillo, C. Caruso and V. Buonocore |
| Anthranilate synthase from *Ailanthus altissima* cell suspension cultures | 395 | R. M. Romero and M. F. Roberts |
| Purification of pectin methylesterase from *Orobanche aegyptiaca* | 403 | N. B. Nun, G. Ben-Hod, E. Lavi and A. M. Mayer |
| Cell wall synthesis in kiwi fruit following postharvest ethylene treatment | 407 | R. J. Redgwell |
| Accumulation of sterols and steroidal sapogenins in developing fenugreek pods: possible biosynthesis *in situ* | 415 | P. Brenac and Y. Sauvaire |
| Effect of tridemorph and fenpropimorph on sterol composition in fenugreek | 423 | C. Cerdon, A. Rahier, M. Taton and Y. Sauvaire |
| **Ecological Biochemistry** | | |
| Volatile components of ripe fruits of *Morinda citrifolia* and their effects on *Drosophila* | 433 | J.-P. Farine, L. Legal, B. Moreteau, and J.-L. Le Quere |
| Enantiomeric compositions of monoterpene hydrocarbons indifferent tissues of four individuals of *Pinus sylvestris* | 439 | K. Sjödin, M. Persson, A.-K. Borg-Karlson and T. Norin |
| 3-Hydroxyacetophenone in carnations is a phytoanticipin active against *Fusarium oxysporum* f. sp. *dianthi* | 447 | P. Curir, A. Marchesini, B. Danieli and F. Mariani |
| **Biosynthesis** | | |
| Biosynthesis of primin and miconidin and its derivatives | 451 | W. Horper and F.-J. Marner |
| Cytochrome P450-dependent methylenedioxy bridge formation in *Cicer arietinum* | 457 | S. Clemens and W. Barz |

**Cell Culture and Biotechnology**

Polysaccharides in primary cell walls of Japanese cypress cells in suspension culture — 461 Y. Takeuchi, M. Nishiyauchi, K. Aoyama and A. Sato

Lipid composition during growth of motile and coccolith forms of *Emiliania huxleyi* — 465 M. V. Bell and D. Pond

Hydroxylation of sodium grindelate by *Cunninghamella echinulata* — 473 C. R. Carreras, J. Rodriguez, H. J. Silva, P. Rossomando, O. S. Giordano and E. Guerreiro

Mechanism of nicotine *N*-demethylation in tobacco cell suspension cultures — 477 D.-Y. Hao and M. M. Yeoman

**Chemotaxonomy**

Distribution of polar lipids in some marine, brackish and freshwater green macrophytes — 483 V. M. Dembitsky and O. A. Rozentsvet

Distribution of iridoids in different populations of *Physostegia virginiana* and some remarks on iridoids from *Avicennia officinalis* and *Scrophularia ningpoensis* — 489 R. Nass and H. Rimpler

Terpenoid constituents of *Viguiera tucumanensis* — 499 K. M. Meragelman, L. A. Espinar, V. E. Sosa, M. L. Uriburu and J.R. de la Fuente

Flavonoid variation in Eurasian *Sedum* and *Sempervivum* — 503 J. F. Stevens, H. 't Hart, E. T. Elema and A. Bolck

**Bioactive Plant Products**

Biologically active sesquiterpenoid metabolites from the fungus *Botrytis cinerea* — 513 I. G. Collado, R. Hernández-Galán, V. Prieto, J. R. Hanson and L. G. Rebordinos

Antifungal eudesmanoids from *Parthenium argentatum* × *P. tomentosa* — 519 G. T. Maatooq, D. K. Stumpf, J. J. Hoffmann, L. K. Hutter and B. N. Timmermann

Coumarins and antiplatelet aggregation constituents from formosan *Peucedanum japonicum* — 525 Ih-Sheng Chen, Chin-Teng Chang, Wine-Show Sheen, Che-Ming Teng, Ian-Lih Tsai, Chang-Yih Duh and Feng-Nien Ko

The flavonoids of *Allium ursinum* — 531 A. Carotenuto, V. De Feo, E. Fattorusso, V. Lanzotti, S. Magno and C. Cicala

Antimicrobial isoflavanones from *Desmodium canum* — 537 G. D. Monache, B. Botta, V. Vinciguerra, J. F. de Mello and A. de Andrade Chiappeta

**Plant Chemistry**

Two *P*-coumaroyl glycerides from *Juncus effusus* — 545 Jin Dong-Zhe, Min Zhi-Da, G. C. Y. Chiou, Munekazu Iinuma and Toshiyuki Tanaka

A sesquiterpene ester from *Celastrus hindsii* — 549 Yao-Haur Kuo, Cheng-Jen Chou, Li-Ming Yang Kuo, Yun-Yu Hu, Yue-Chih Chen, Chieh-Fu Chen and Kuo-Hsiung Lee

Sesquiterpene lactones with the uncommon rotundane skeleton from *Artemisia pontica* L. — 553 M. N. Todorova, E. T. Tsankova, A. B. Trendafilova and C. V. Gussev

An artemisinic acid analogue from *Tithonia diversifolia* — 557 M. Bordoloi, N. C. Barua and A. C. Ghosh

Clerodane diterpenes and other constituents of *Croton hovarum* — 561 H. C. Krebs and H. Ramiarantsoa

| | | |
|---|---|---|
| Clerodane diterpenes from the bark of *Casearia tremula* | 565 | S. Gibbons, A. I. Gray and P. G. Waterman |
| A rearranged abietane diterpenoid from *Plectranthus hereroensis* | 571 | O. Batista, M. F. Simões, J. Nascimento, S. Riberio, A. Duarte, B. Rodríguez and M. C. de la Torre |
| Terpenoid constituents of the liverwort *Heteroscyphus coalitus* | 575 | M. Toyota, I. Nakamura, S. Takaoka, Y. Kan and Y. Asakawa |
| Spiro-γ-lactone diterpenes from *in vitro* cultures of the liverwort, *Heteroscyphus planus* | 581 | K. Nabeta, T. Oohata, S. Ohkubo, T. Sato and K. Katoh |
| The absolute configuration of salvileucolide methyl ester, asesterterpene from Iranian *Salvia* species | 589 | A. Linden, M. Juch, F. M. Moghaddam, B. Zaynizadeh and P. Rüedi |
| Pentacyclic triterpenes from *Combretum nigricans* | 591 | A. Jossang, M. Seuleiman, E. Maidou and B. Bodo |
| 5β,24α-Stigmasta-8, 22-dien-3β-ol, a sterol from *Koelpinia linearis* | 595 | W. A. Shah, M. A. Qurishi, S. K. Koul and K. L. Dhar |
| Oligofurostanosides and oligospiostranosides from roots of *Asparagus filicinus* | 599 | S. C. Sharma and N. K. Thakur |
| Two sesquilignans from the wood of *Abies marocana* | 605 | A. F. Barrero, A. Haïdour, M. M. Dorado and J. M. Cuerva |
| Pelliatin, a macrocyclic lignan derivative from *Pellia epiphylla* | 611 | F. Cullmann, K.-P. Adam, J. Zapp and H. Becker |
| Proanthocyanidins from *Lotus corniculatus* | 617 | L. Y. Foo, R. Newman, G. Waghorn, W. C. McNabb and M. J. Ulyatt |
| Shanciol, a dihydrophenanthropyran from *Pleione bulbocodioides* | 625 | L. Bai, M. Yamaki, Y. Yamagata and S. Takagi |
| Three xanthones from *Garcinia subelliptica* | 629 | H. Minami, E. Takahashi, M. Kodama and Y. Fukuyama |
| Acylated cyanidin 3,7,3′-triglucosides in flowers of × *Laeliocattley* acv. mini purple and its relatives | 635 | F. Tatsuzawa, N. Saito, M. Yokoi, A. Shigihara and T. Honda |
| Chamaemeloside, a new flavonoid glycoside from *Chamaemelum nobile* | 643 | G. M. Tschan, G. M. König, A. D. Wright and O. Sticher |
| Alkaloids and coumarins from *Esenbeckia* species | 647 | F. M. Oliveira, A. E. G. Sant'ana, L. M. Conserva, J. G. S. Maia and G. M. P. Guilhon |
| Acylated tetrahydroisoquinoline-monoterpene glucosides from *Alangium lamarckii* | 651 | A. Itoh, T. Tanahashi and N. Nagakura |
| **Short Reports** | | |
| A dimeric sinapaldehyde glucoside from *Ilex rotunda* | 657 | Dong-Xu Wen and Zhong-Liang Chen |
| Flavonoids from *Eschscholtzia californica* | 661 | L. Jain, M. Tripathi, V. B. Pandey and G. Rücker |
| **Book Review** | 663 | |

## Number 3

**Growth and Metabolism**

Cyclo-(L-tryptophyl-L-phenylalanyl), a plant growth regulator produced by the fungus *Penicillium* sp. 665 Y. Kimura, K. Tani, A. Kojima, G. Sotoma, K. Okada and A. Shimada

Structure–activity relationship of lepidimoide and its analogues 671 K. Yamada, T. Anai, S. Kosemura, S. Yamamura and K. Hasegawa

Gibberellic acid decomposition and its loss of biological activity in aqueous solutions 675 F. J. Pérez, A. Vecchiola, M. Pinto and E. Agosin

ABA levels in chick-pea seeds during the first twenty-four hours of germination. Effect of polyethylene-glycol 681 R. G. Iglesias and M. J. Babiano

Chemical modification of essential arginine residues associated with the red beet (*Beta vulgaris* L.) plasma membrane $Ca^{2+}$–ATPase 685 S. Basu and D. P. Briskin

Role of chlorophyllase in chlorophyll metabolism in olives cv. Gordal 691 Ma. I. Minguez-Mosquera and L. Gallardo-Guerrero

Distribution of catalase isoforms in *Nicotiana tabacum* 699 E. A. Havir, L. F. Brisson and I. Zelitch

Purification and properties of $\alpha$-glucosidase from millet seeds 703 Y. Yamasaki, H. Konno and H. Masima

Aspartate kinase in the maize mutants *ASK1-LT19* and *OPAQUE-2* 707 K. Brennecke, A. J. Souza Neto, J. Lugli, P. J. Lea and R. A. Azevedo

Multiple forms of starch phosphorylase from *Sorghum* leaves 713 B. Venkaiah and A. Kumar

Solubilization of pectic polysaccharides from the cell walls of *Lemna minor* and *Apium graveolens* 719 P. K. Kindel, L. Cheng and B. R. Ade

Conversion of furostanol glycoside to spirostanol glycoside by $\beta$-glucosidase in *Costus speciosus* 725 K. Inoue, K. Shimomura, S. Kobayashi, U. Sankawa and Y. Ebizuka

NADPH and protoporphyrin IX dependent conversion of violaxanthin to a *retro*-carotenoid in *Narcissus pseudonarcissus* chromoplasts *in vitro* 729 M. Lützow, F. Haaf, G. Englert, P. Beyer and H. Kleinig

**Ecological Biochemistry**

Antimicrobial abietane diterpenoids from *Plectranthus elegans* 735 J. E. Dellar, M. D. Cole and P. G. Waterman

Nimbolidins C–E, limonoid antifeedants from *Melia toosendan* 739 M. Nakatani, J.-B. Zhou, N. Nakayama, H. Okamura and T. Iwagawa

24-Epi-pterosterone: a novel phytoecdysone from the roots of *Athyrium yokoscense* 745 S. Ohta, J.-R. Guo, Y. Hiraga and T. Suga

Cyclozonarone, a sesquiterpene-substituted benzoquinone derivative from the brown alga *Dictyopteris undulata* 749 K. Kurata, K. Taniguchi and M. Suzuki

Musanolones: four 9-phenylphenalenones from rhizomes of *Musa acuminata* 753 J. G. Luis, W. Quiñones, F. Echeverri, T. A. Grillo, M. P. Kishi, F. Garcia-Garcia, F. Torres and G. Cardona

Detoxification of the phytoalexins maackiain and medicarpin by fungal pathogens of alfalfa 759 S. Soby, S. Caldera, R. Bates and H. VanEtten

**Biosynthesis**

1-Methylpyrrolidine-2-acetic acid is not a precursor of tropane alkaloids 767 M. N. Huang, T. W. Abraham, S. H. Kim and E. Leete

**Cell Culture and Biotechnology**

Ellagic acid derivatives and naphthoquinones of *Dionaea muscipula* from *in vitro* cultures — 775 G. Pakulski and J. Budzianowski

**Chemotaxonomy**

Leucine-derived nitrile glucosides in the Rosaceae and their systematic significance — 779 M. Lechtenberg, A. Nahrstedt and F. R. Fronczek

Sucrose esters from the surface lipids of *Petunia hybrida* — 787 I. Ohya, Y. Shinozaki, T. Tobita, H. Takahashi and T. Matsuzaki

Acylglycerols from the slime mould, *Lycogala epidendrum* — 791 M. S. Buchanan, T. Hashimoto and Y. Asakawa

Three dihydroanthracenones from *Gasteria bicolor* — 795 E. Dagne, B.-E. Van Wyk, M. Mueller and W. Steglich

Homoerythrina alkaloids from silver pine, *Lagarostrobos colensoi* — 801 S. J. Bloor, J. P. Benner, D. Irwin and P. Boother

**Bioactive Plant Products**

Isolation and semi-synthesis of a bioactive taxane from *Taxus canadensis* — 803 L. O. Zamir, M. E. Nedea, Z.-H. Zhou, G. Caron, F. Sauriol and O. Mamer

Flavan-3-ols and prodelphinidins from *Stryphnodendron adstringens* — 807 J. P. de Mello, F. Petereit and A. Nahrstedt

Cytotoxic xanthones from *Garcinia hanburyi* — 815 J. Asano, K. Chiba, M. Tada and T. Yoshii

Cytochalasins from a *Daldinia* sp. of fungus — 821 M. S. Buchanan, T. Hashimoto and Y. Asakawa

**Plant Chemistry**

$\alpha$-Santaldiol and $\beta$-santaldiol, two santalane sesquiterpenes from *Santalum insulare* — 829 T. Alpha, P. Rahariveloma nana, J.-P. Bianchini, R. Faure, A. Cambon and L. Joncheray

Eudesmane-type sesquiterpenoids from the liverwort *Lepidozia vitrea* — 833 M. Toyota, E. Nakaishi and Y. Asakawa

Tricyclic sesquiterpenes from *Artemisia chamaemelifolia* — 837 J. A. Marco, J. F. Sanz-Cervera, M. D. Morante, V. García-Lliso, J. Vallès-Xirau and J. Jakupovic

15-Norguaianolides and germacranolides from *Mikania mendocina* — 845 A. Bardón, L. Cardona, C. A. N. Catalán and J. R. Pedro

Constituents of two *Acalypha* species — 851 K. Siems, J. Jakupovic, V. Castro and L. Poveda

A clerodane diterpene from *Scutellaria altissima* — 855 P. Y. Malakov, G. Y. Papanov and I. M. Boneva

Cedrene isoprenologues from a new *Eremophila* species — 859 Y. M. Syah and E. L. Ghisalberti

Taxanes from the bark of *Taxus brevifolia* — 863 K. V. Rao, R. S. Bhakuni, J. B. Hanuman, R. Davies and J. Johnson

D:A-friedo-oleanane triterpenes from the stem of *Homalium longifolium* — 867 K. Shaari and P. G. Waterman

Triterpenes and triterpenoid glycosides from the leaves of *Ilex kudincha* — 871 Ming-An Ouyang, Chong-Ren Yang, Zi-Li Chen and Han-Qing Wang

Scrokoelziside A, a triterpene glycoside from *Scrophularia koelzii* — 879 S. P. S. Bhandari, R. Roy, P. K. Agrawal and H. S. Garg

Triterpenoid saponins of *Mimusops elengi* 883 N. P. Sahu

Saponins from three species of *Mimusops* 887 C. Lavaud, G. Massiot, M. Becchi, G. Misra and S. K. Nigam

Saponins from the root of *Bupleurum falcatum* 895 N. Ebata, K. Nakajima, K. Hayashi, M. Okada and M. Maruno

A limonoid from *Xylocarpus granatum* 903 U. Kokpol, W. Chavasiri, S. Tip-pyang, G. Veerachato, F. Zhao, J. Simpson and R. T. Weavers

Cholestane- and pregnane-type glycosides from the roots of *Tribulus cistoides* 907 H. Achenbach, H. Hübner and M. Reiter

Bianthraquinones from the seeds of *Senna multiglandulosa* 919 G. Alemayehu and B. M. Abegaz

Phloroglucinols from *Baeckea frutescens* 923 Y. Fujimoto, S. Usui, M. Makino and M. Sumatra

Hispolon, a yellow pigment from *Inonotus hispidus* 927 N. A. A. Ali, R. Jansen, H. Pilgrim, K. Liberra and U. Lindequist

4-Hydroxy-5-methylcoumarin derivatives from *Diospyros kaki* Thunb and *D. kaki* var. *sylvestris* Makino; structure and synthesis of 11-methylgerberinol 931 S. K. Paknikar, K. P. Pai Fondekar, J. K. Kirtany and S. Natori

A neolignan and sterols in fruits of *Solanum sisymbrifolium* 935 A. K. Chakravarty, S. Mukhopadhyay, S. Saha and S. C. Pakrashi

Flavonoids and triterpene ester derivatives from *Erythroxylum leal costae* 941 J. P. Chávez, I. D. Dos Santos, F. G. Cruz and J. M. David

Two isoflavones from the bark of *Petalostemon purpureus* 945 S. K. Chaudhuri, F. Fullas, M. C. Wani, M. E. Wall, J. C. Tucker, C. W. W. Beecher and A. D. Kinghorn

Isocladrastin and kashmigenin—two isoflavones from *Iris kashmiriana* 947 T. K. Razdan, P. K. Kachroo, B. Qadri, A. K. Kalla, S. C. Taneja, S. K. Koul and K. L. Dhar

Four isoflavones from seed pods of *Millettia dura* 951 A. Yenesew, J. O. Midiwo and P. G. Waterman

Diterpenoid alkaloids from *Aconitum orientale* 957 A. Ulubelen, A. H. Meriçli, F. Meriçli and F. Yilmaz

Indole alkaloids from *Aspidosperma ramiflorum* 963 M. F. S. Marques, L. Kato, H. F. Leitão Filho and F. de A. M. Reis

Indole alkaloids from *Rauwolfia sellowii* 969 C. V. F. Batista, J. Schripsema, R. Verpoorte, S. B. Rech and A. T. Henriques

**Short Reports**

Fructosides from *Cynomorium songaricum* 975 Cheng-Zhong Zhang, Xiu-Zhi Xu and Chong Li

A guaiane-type sesquiterpene, valeracetate from *Valeriana officinalis* 977 M. Tori, M. Yoshida, M. Yokoyama and Y. Asakawa

Withanolides from *Datura tatula* 981 M. Manickam, S. B. Awasthi, A. Sinha-Bagchi, S. C. Sinha and A. B. Ray

Jatrodien, a lignan from stems of *Jatropha gossypifolia* 985 B. Das, S. P. Rao, K. V. N. S. Srinivas and R. Das

An acylated isorhamnetin glycoside from *Herniaria fontanesii* 989 A. N. Mbark, D. Guillaume, Y. Cherrah, J. M. Wieruszeki, G. Ricart and Z. Charrouf

Brevicornin, a flavonol from *Epimedium brevicornum* 991 Bao-Lin Guo, Wen-Kui Li, Jing-Guang Yu and Pei-Gen Xiao

**Book Review** 993

## Number 4

**Review Article Number 111**

The distribution of lignanoids in the order Coniferae 995 M. A. Castro, M. Gordaliza, J. M. Miguel Del Corral and A. San Feliciano

**Growth and Metabolism**

Two *N*-acetyl-D-galactosamine-specific lectins from *Phaeolepiota aurea* 1013 H. Kawagishi, T. Wasa, T. Murata, T. Usui, A. Kimura and S. Chiba

Primary structure of a Kunitz-type trypsin inhibitor from *Enterolobium contortisiliquum* seeds 1017 I. F. C. Batista, M. L. V. Oliva, M. S. Araujo, M. U. Sampaio, M. Richardson, H. Fritz and C. A. M. Sampaio

Partial purification and characterization of 6-hydroxymellein-*O*-methyltransferase from elicitor-treated carrot cells 1023 F. Kurosaki

Purification and unusual kinetic properties of a tobacco anionic peroxidase 1029 I. G. Gazaryan and L. M. Lagrimini

**Ecological Biochemistry**

Fusaric and 9,10-dehydrofusaric acids and their methyl esters from *Fusarium nygamai* 1035 R. Capasso, A. Evidente, A. Cutignano, M. Vurro, M. C. Zonno and A. Bottalico

Antimicrobial steroids from the fungus *Fomitopsis pinicola* 1041 A. C. Keller, M. P. Maillard and K. Hostettmann

**Biosynthesis**

Purification of (+)-$\delta$-cadinene synthase, a sesquiterpene cyclase from bacteria-inoculated cotton foliar tissue 1047 E. M. Davis, J. Tsuji, G. D. Davis, M. L. Pierce and M. Essenberg

Biosynthesis of 24$\beta$-alkyl $\Delta^{-25}$-sterols in hairy roots of *Ajuga reptans* var. *atropurpurea* 1057 T. Yagi, M. Morisaki, T. Kushiro, H. Yoshida and Y. Fujimoto

Inhibition and regulation of shikonin biosynthesis in suspension cultures of *Lithospermum* 1065 S. Gaisser and L. Heide

Carbon isotope pattern in purine alkaloids. A key to isotope discriminations in $C_1$ compounds 1073 T. Weilacher, G. Gleixner and H.-L. Schmidt

**Cell Culture and Biotechnology**

Biotransformation of geraniol and nerol by spores of *Penicillium italicum* 1079 J. C. R. Demyttenaere and H. L. De Pooter

**Chemotaxonomy**

Sterols and triterpenoids from the cyanobacterium *Anabaena hallensis* 1083 T. Hai, B. Schneider, J. Schmidt and G. Adam

**Plant Chemistry**

5,6-Dihydro-$\alpha$-pyrones from *Syncolostemon parviflorus* 1085 M. T. Davies-Coleman and D. E. A. Rivett

| | | |
|---|---|---|
| Monohydroxylactones of *Lactarius vellereus* | 1093 | W. M. Daniewski, M. Gumulka, D. Truszewska, U. Jacobsson and T. Norin |
| Oxygenated cyclohexanes from *Piper cubeb* | 1097 | J. L. Koul, S. K. Koul, S. C. Taneja and K. L. Dhar |
| Pannosallene, a brominated $C_{15}$ nonterpenoid from *Laurencia pannosa* | 1101 | M. Suzuki, Y. Takahashi, Y. Matsuo and M. Masuda |
| A germacranolide from *Artemisia pallens* | 1105 | S. R. Rojatkar, S. S. Pawar, P. P. Pujar, D. D. Sawaikar, S. Gurunath, V. T. Sathe and B. A. Nagasampagi |
| Circular dichroism of C-7, C-6 *trans*-fused guaianolides of *Centaurea scoparia* | 1107 | D. Youssef and A. W. Frahm |
| Sesquiterpene lactones and elemane derivatives from *Onopordon myriacanthum* | 1113 | B. García, H. Skaltsa, F. I. Navarro, J. R. Pedro and D. Lazari |
| Drimanes from the epicuticular wax of the fern *Nephrolepis biserrata* | 1119 | K. Siems, F. Weigt and E. Wollenweber |
| Diterpenoids from *Baccharis linearis* | 1123 | K. He, G. Montenegro, J. J. Hoffmann and B. N. Timmermann |
| *Ent*-kaurane-type diterpenoids from the liverwort *Jungermannia exsertifolia* ssp. *cordifolia* | 1129 | F. Nagashima, H. Tanaka, S. Takaoka and Y. Asakawa |
| Rearranged abietane diterpenes from *Salvia limbata* | 1143 | G. Topcu, C. Eriş and A. Ulubelen |
| Diterpenes and phloracetophenones from *Euphorbia portulacoides* | 1149 | T. Morgenstern, M. Bittner, M. Silva, P. Aqueveque and J. Jakupovic |
| Isofregenedadiol: a novel diterpenic diol from *Halimium viscosum* | 1155 | I. S. Marcos, A. Jorge, D. Diez, P. Basabe, A. M. Lithgow, M. J. Sexmero, N. M. Garrido and J. G. Urones |
| Diterpenes from *Guarea trichilioides* | 1159 | M. Furlan, M. N. Lopes, J. B. Fernandes and J. R. Pirani |
| A 3,4-*seco*-8$\beta H$-fernadienoic acid and other constituents from *Euphorbia chamaesyce* | 1163 | R. Tanaka, T. Ida, S. Kita, W. Kamisako and S. Matsunaga |
| Cucurbitane glycosides from *Hemsleya panacis-scandens* rhizomes | 1169 | H. Kubo, K. Ohtani, R. Kasai, K. Yamasaki, R.-L. Nie and O. Tanaka |
| Saponins from *Fagonia arabica* | 1175 | T. Miyase, F. R. Melek, O. D. El-Gindi, S. M. Abdel-Khalik, M. R. El-Gindi, M. Y. Haggag and S. H. Hilal |
| Triterpenoid saponins from *Gymnema sylvestre* | 1181 | N. P. Sahu, S. B. Mahato, S. K. Sarkar and G. Poddar |
| Cardenolides from *Erysimum cheiranthoides* | 1187 | Zhen-Huan Lei, S. Yahara, T. Nohara, Tai-Bao Shan and Jin-Zhe Xiong |
| Antibacterial hydroperoxysterols from *Xanthosoma robustum* | 1191 | T. Kato, B. Frei, M. Heinrich and O. Sticher |
| Oleanen and stigmasterol derivatives from *Ambroma augusta* | 1197 | M. S. Alam, N. Chopra, M. Ali and M. Niwa |

Isolation of methyl 9′*Z*-apo-6′-lycopenoate from *Bixa orellana* 1201 A. Z. Mercadante, A. Steck, D. Rodriguez-Amaya, H. Pfander and G. Britton

A benzoic acid glycoside from *Geniostoma antherotrichum* 1205 M. A. Rashid, K. R. Gustafson, J. H. Cardellina II and M. R. Boyd

The structure and synthesis of proguibourtinidins from *Cassia abbreviata* 1209 E. Malan, E. Swinny, D. Ferreira and P. Steynberg

Revised structure of broussoflavonol G and the 2D NMR spectra of some related prenylflavonoids 1215 Chun-Nan Lin, Pao-Hui Chiu, Song-Chwan Fang, Bor-Jinn Shieh and Ru-Rong Wu

Highly oxygenated isoflavones from *Iris japonica* 1219 H. Minami, A. Okubo, M. Kodama and Y. Fukuyama

Two prenylated isoflavans from *Millettia racemosa* 1223 C. Prakash Rao, A. Prashant and G. L. D. Krupadanam

A pyrroline glucoside ester and steroidal saponins from *Lilium martagon* 1225 T. Satou, Y. Mimaki, M. Kuroda, Y. Sashida and Y. Hatakeyama

(+)-3′-*O*-Acetylisopteleflorine, a quinoline alkaloid from *Orixa japonica* 1231 S. Funayama, K. Murata and S. Nozoe

Five diterpenoid alkaloids from *Delphinium cardiopetalum* 1235 M. Reina, A. Madinaveitia, J. A. Gavín and G. de la Fuente

## Number 5

**Growth and Metabolism**

Probing the role of the hydroxyl group of ABA: analogues with a methyl ether at C-1′ 1251 P. A. Rose, B. Lei, A. C. Shaw, D. L. Barton, M. K. Walker-Simmons and S. R. Abrams

Expression of poplar phenylalanine ammonia-lyase in insect cell cultures 1259 G. R. McKegney, S. L. Butland, D. Theilmann and B. E. Ellis

Primary structure of trypsin inhibitors from *Sicyos australis* 1265 R. I. Mar, J. A. Carver, M. M. Sheil, J. Boschenok, S. Fu and D. C. Shaw

Lipid constituents of oil bodies in the cultured shoot primordia of *Matricaria chamomilla* 1275 T. Hirata, S. Izumi, K. Akita, N. Fukuda, S. Katayama, K. Taniguchi, L. Dyas and L. J. Goad

Localization of iridals in *Iris germanica* rhizomes 1281 J.-P. Bonfils and Y. Sauvaire

**Ecological Biochemistry**

Four chromones from *Eriosema tuberosum* 1287 Wei Guang Ma, N. Fuzzati, Yun Xue, Chong Ren Yang and K. Hostettmann

Insecticidal properties of mushroom and toadstool carpophores 1293 N. Mier, S. Canete, A. Klaebe, L. Chavant and D. Fournier

**Biosynthesis**

Sterol analysis of DMI-resistant and -sensitive strains of *Venturia inaequalis* 1301 N. Shirane, H. Takenaka, K. Ueda, Y. Hashimoto, K. Katoh and H. Ishii

**Cell Culture and Biotechnology**

*O*-Acetylated xyloglucan in extracellular polysaccharides from cell-suspension cultures of *Mentha* 1309 K. Maruyama, C. Goto, M. Numata, T. Suzuki, Y. Nakagawa, T. Hoshino and T. Uchiyama

**Chemotaxonomy**

Alginate composition of some New Zealand brown seaweeds 1315 I. J. Miller

Alkaloids of some Asian *Sedum* species 1319 J. H. Kim, H. 't Hart and J. F. Stevens

**Bioactive Plant Products**

Cytotoxic cycloartanes from *Aglaia argentea* 1325 O. R. Omobuwajo, M.-T. Martin, G. Perromat, T. Sevenet, K. Awang and M. Païs

**Plant Chemistry**

Two furanone glucoside derivatives from *Juniperus phœnicea* 1329 G. Comte, D. P. Allais, A. J. Chulia, J. Vercauteren and C. Delage

Norisoprenoids from *Viburnum dilatatum* 1333 K. Machida and M. Kikuchi

Monoterpene and coumarin glucosides of *Cnidium silaifolium* 1337 J. Lemmich

Two dimeric secoiridoid glucosides from *Jasminum polyanthum* 1341 T. Tanahashi, Y. Takenaka and N. Nagakura

(−)-*Ent*-spathulenol isolated from liverworts is an artefact 1347 M. Toyota, H. Koyama, M. Mizutani and Y. Asakawa

Alangicadinosides A–E: sesquiterpene glycosides from leaves of *Alangium premnifolium* 1351 H. Otsuka, M. Yao, E. Hirata, A. Takushi and Y. Takeda

Sesquiterpene and diterpene glycosides from *Xanthium spinosum* 1357 S. Piacente, C. Pizza, N. De Tommasi and F. De Simone

Terpenes from heartwood of *Juniperus chinensis* 1361 Jim-Min Fang, Ying-Chih Chen, Beng-Wern Wang and Yu-Shia Cheng

Meroditerpenes from the brown alga *Cystoseira amentacea* var. *stricta* collected off the French Mediterranean coast 1367 R. Valls, V. Mesguiche, L. Piovetti, M. Prost and G. Peiffer

Phytyl esters and phaeophytins from the hornwort *Megaceros flagellaris* 1373 M. S. Buchanan, T. Hashimoto and Y. Asakawa

A triterpene epoxide and a guaianolide from *Ptilostemmon gnaphaloides* 1377 F. Menichini, R. di Benedetto and F. Delle Monache

Abrusoside E, a further sweet-tasting cycloartane glycoside from the leaves of *Abrus precatorius* 1381 E. J. Kennelly, L. Cai, N.-C. Kim and A. D. Kinghorn

Further polyoxypregnanes from *Marsdenia tenacissima* 1385 Sheng-Xiang Qiu, Si-Qi Luo, Long-Ze Lin and G. A. Cordell

Steroids and triterpenoids of *Antrodia cinnamomea*—a fungus parasitic on *Cinnamomum micranthum* 1389 Shu-Wei Yang, Ya-Ching Shen and Chung-Hsiung Chen

7,8-Dihydroajugasterone C, norhygrine and other constituents of *Nierembergia hippomanica* 1393 A. B. Pomilio, M. D. González and C. C. Ceeizabarrena

Triterpenoid saponins from *Bellium bellidioides*. Structures of the minor deacylsaponins 1399 T. Schöpke, V. Wray, M. Nimtz and K. Hiller

Steroidal saponins from the underground parts of *Chlorophytum comosum* and their inhibitory activity on tumour promoter-induced phospholipids metabolism of HeLa cells 1405 Y. Mimaki, T. Kanmoto, Y. Sashida, A. Nishino, Y. Satomi and H. Nishino

Araliasaponins I-XI, triterpene saponins from the roots of *Aralia decaisneana* 1411 T. Miyase, K.-I. Shiokawa, D. M. Zhang and A. Ueno

Minor dammarane saponins from *Panax notoginseng* 1419 Ping Zhao, Yu-Qing Liu and Chong-Ren Yang

Coumarins from *Peucedanum praeruptorum* 1423 Ling-Yi Kong, Yi Li, Zhi-Da Min, Xian Li and Ting-Ru Zhu

Stoichiometric studies of tannin–protein co-precipitation 1427 H. Kawamoto, F. Nakatsubo and K. Murakami

Carbazole alkaloids from the leaves of *Murraya euchrestifolia* 1433 Tian-Shung Wu, Meei-Ling Wang, Pei-Lin Wu, C. Ito and H. Furukawa

**Short Reports**

Unusual homologous long-chain alkanoic acid esters of lupeol from *Koelpinia linearis* 1437 T. K. Razdan, P. K. Kachroo, M. A. Qurishi, A. K. Kalla and E. S. Waight

Isoplagiochilide from the liverwort *Plagiochila elegans* 1439 Shu-Jen Lin and Chia-Li Wu

Niruroidine, a norsecurinine-type alkaloid from *Phyllanthus niruroides* 1441 Babady-Bila, T. E. Gedris and W. Herz

## Number 6

**Growth and Metabolism**

Lipoxygenase-mediated formation of hydrocarbons and unsaturated aldehydes in freshwater diatoms 1445 T. Wendel and F. Jüttner

Strictosidine glucosidase from suspension cultured cells of *Tabernaemontana divaricata* 1451 T. J. C. Luijendijk, A. Nowak and R. Verpoorte

Purification of acid phosphatase I from germinating seeds of *Vigna sinensis* 1457 T. K. Biswas, M. Promo and B. Biswas

Partial purification and characterization of a calcium-dependent protein kinase in rice leaves 1459 H. Karibe, S. Komatsu and H. Hirano

Substrate specificity of the short chain fatty acyl-coenzyme A synthetase of *Pinus radiata* 1465 S. G. Orchard and J. W. Anderson

**Ecological Biochemistry**

A stress compound in oats induced by victorin, a host-specific toxin from *Helminthosporium victoriae* 1473 H. Miyagawa, A. Ishihara, Y. Kuwahara, T. Ueno and S. Mayama

Floral fragrance chemistry in the early flowering shrub *Daphne mezereum* 1477 A.-K. Borg-Karlson, C. R. Unelius, I. Valterová and L. A. Nilsson

Isolation of 5-(8′*Z*-heptadecenyl)-resorcinol from etiolated rice seedlings as an antifungal agent 1485 Y. Suzuki, Y. Esumi, H. Hyakutake, Y. Kono and A. Sakurai

**Biosynthesis**

Formation of albizziine and 2,3-diaminopropanoic acid from uracil in *Albizia* seedlings 1491 E. G. Brown and Y. Turan

6-*O*-α-L-Arabinopyranosyl-β-D-glucopyranosides as aroma pre-cursors from passion fruit 1497 D. Chassagne, J. Crouzet, C. L. Bayonove, J.-M. Brillouet and R. L. Baumes

Initiation of rubber biosynthesis in *Hevea brasiliensis*: characterization of initiating species by structural analysis 1501 Y. Tanaka, E. Aik-Hwee, N. Ohya, N. Nishiyama, J. Tangpakdee, S. Kawahara and R. Wititsuwannakul

Caffeic acid: *O*-methyltransferases and the biosynthesis of ferulic acid in primary cell walls of wheat seedlings 1507 T. B. T. Lam, K. Iiyama and B. A. Stone

13-Hydroxylation of tetrahydroberberine in cell suspension cultures of some *Corydalis* species 1511 K. Iwasa and M. Kamigauchi

**Cell Culture and Biotechnology**

Extracellular polysaccharides produced by tuberose callus 1517 Y. Honda, H. Inaoka, A. Takei, Y. Sugimura and K. Otsuji

Malondialdehyde cannot be related to lipoperoxidation in habituated sugarbeet plant cells 1523 M. Chérif, P. Nodet and D. Hagège

Biotransformation of progesterone by the green alga *Chlorella emersonii* C211-8H 1527 M. D. Greca, A. Fiorentino, G. Pinto, A. Pollio and L. Previtera

Production of acylated anthocyanins by blue flowers of *Hyacinthus orientalis* regenerated *in vitro* 1531 K. Hosokawa, Y. Fukunaga, E. Fukushi and J. Kawabata

**Chemotaxonomy**

Distribution of an amino acid-containing phospholipid in brown algae 1535 S. V. Khotimchenko and T. V. Titlyanova

Further sesquiterpene lactones from *Inula salsoloides* 1539 F. Jeske, S. Huneck and J. Jakupovic

Sesquiterpene lactones from two *Bejaranoa* species 1543 T. Morgenstern, R. M. King and J. Jakupovic

Plicataloside, an *O,O*-diglycosylated naphthalene derivative from *Aloe plicatilis* 1547 P. L. Wessels, C. W. Holzapfel, B.-E. van Wyk and W. Marais

**Plant Chemistry**

Three monoterpenes from *Mussaenda pubescens* 1553 Weimin Zhao, Genjin Yang, Rensheng Xu and Guowei Qin

A secoiridoid glucoside from *Fraxinus angustifolia* 1557 I. Calis, M. Hosny and M. F. Lahloub

Phyllocladanes (13$\beta$-kauranes) from *Plectranthus ambiguus* 1563 Gui Liu and P. Rüedi

Diterpenes and a flavone from *Leucas neufliseana* 1569 A. T. Khalil, S. R. Gedara, M. F. Lahloub and A. F. Halim

Triterpenoids from *Melilotus messanensis*; soyasapogenol G, the first natural carbonate derivative 1573 F. A. Macías, A. M. Simonet, M. D. Esteban and J. C. G. Galindo

Minor constituents from *Bupleurum fruticosum* roots 1579 L. Pistelli, A. Bertoli, A. R. Bilia and I. Morelli

Coupling reactions between flavylium ions and catechin 1583 T. Escribano-Bailón, O. Dangles and R. Brouillard

Phenolic and triterpenoid glycosides from *Aster batangensis* 1593 Yu Shao, Yun Long Li and Bing Nan Zhou

Acylated delphinidin glycosides in the blue-violet flowers of *Consolida armeniaca* 1599 N. Saito, K. Toki, S. Özden and T. Honda

Acylated peonidin glycosides in the slate flowers of *Pharbitis nil* 1607 N. Saito, F. Tatsuzawa, K. Kasahara, M. Yokoi, S. Iida, A. Shigihara and T. Honda

Acylated pelargonidin 3-sambubioside-5-glucosides in *Matthiola incana* 1613 N. Saito, F. Tatsuzawa, A. Hongo, K. W. Win, M. Yokoi, A. Shigihara and T. Honda

The biflavonoids of *Plagiomnium undulatum* 1621 C. Rampendahl, T. Seeger, H. Geiger and H. D. Zinsmeister

Two isoflavones from the bark of *Petalostemon purpureus* 1625 S. K. Chaudhuri, F. Fullas, M. C. Wani, M. E. Wall, J. C. Tucker, C. W. W. Beecher and A. D. Kinghorn

22,26-Epiminocholestane alkaloids with unusual (20*R*)-configurations from *Solanum* species 1629 H. Ripperger

Steroid alkaloid glycosides from *Solanum coccineum* 1633 S. Lorey, A. Porzel and H. Ripperger

**Corrigenda** 1637